

Claims

[c1] 1. A dual flush toilet system for selectively flushing solid waste or liquid waste, said dual flush toilet system comprising:

a water tank with a discharge opening on the bottom of said water tank for storing and receiving water;

a toilet bowl located below said water tank and connected to said water tank by said discharge opening;

a spud having an elongated upstanding body with a lower end secured on said discharge opening of said water tank;

a flush valve comprising a tubular element upstanding and extending above the water surface in said water tank and slidably engaged with said spud, a float chamber attached on the lower portion of said tubular element, and a ring attached at the upper portion of said tubular element; and

engaging means connecting said flush valve and a support for engaging the movement of said flush valve to perform a full flush operation or a partial flush operation to flush wastes in said toilet bowl.

[c2] 2. The dual flush toilet system according to claim 1,

wherein said engaging means engages said flush valve with both vertical travels and rotations about a vertical axis.

- [c3] 3. The dual flush toilet system according to claim 1, wherein said engaging means comprises protrusion means and a groove member with a V-shaped groove recessed in said groove member, wherein said protrusion means is slidably engaged with said V-shaped groove.
- [c4] 4. The dual flush toilet system according to claim 1, further comprising limit means for limiting the vertical travel of said flush valve, wherein said limit means engages the interactions between said flush valve and a support.
- [c5] 5. The dual flush toilet system according to claim 4, wherein said limit means comprises a limit member, a stop member, and adjustable means for adjusting the vertical travel limit of said flush valve, wherein said stop member selectively engages with said limit member.
- [c6] 6. The dual flush toilet system according to claim 1, further comprising load means for selectively engaging and applying a downward force on said flush valve, wherein said load means engages said flush valve with a support.
- [c7] 7. The dual flush toilet system according to claim 6,

wherein said load means comprises spring means, a stop member, and adjustable means for adjusting the loading force of said spring means.

- [c8] 8. The dual flush toilet system according to claim 6, wherein said load means comprises reservoir means generally attached on upper portion of said flush valve for receiving, storing, and discharging the water from said toilet tank into said discharge opening, diverter means for diverting water into said discharge opening, and tube means for selectively filling water into said reservoir means or said diverter means.
- [c9] 9. The dual flush toilet system according to claim 1, further comprising load means attached to float means for selectively engaging and applying a downward force on said flush valve in a flush operation, wherein said load means engages said flush valve with float means for controlling the timing to push said flush valve downward to close said discharge opening.
- [c10] 10. The dual flush toilet system according to claim 9, wherein said load means comprises adjustable means for adjusting the timing to apply a downward load to said flush valve.
- [c11] 11. The dual flush toilet system according to claim 9,

wherein said float means has a specific gravity smaller than the specific gravity of water and generally moves responding to the rise and fall of the water level in said water tank.

- [c12] 12. The dual flush toilet system according to claim 1, further comprising a control means comprising:
- a first push rod mounted on the cover of said water tank for activating said flush valve to perform a full flush operation;
 - a second push rod mounted on the cover of said water tank for activating said flush valve to perform a partial flush operation;
 - first flexible means connecting said flush valve to said first push rod for activating said flush valve to perform a full flush operation;
 - second flexible means connecting said flush valve to said second push rod for activating said flush valve to perform a partial flush operation;
 - spring means for returning said first push rod or said second push rod to a predetermined position after a flush operation; and
 - guide means for altering the directions of said first flexible means and said second flexible means.

- [c13] 13. The dual flush toilet system according to claim 1, further comprising control means comprising:

a push rod pivotally mounted on the cover of said water tank for activating said flush valve to perform a full flush or a partial flush operation for said flush valve;

first flexible means connecting said flush valve to said push rod for activating said flush valve to perform a full flush operation;

second flexible means connecting said flush valve to said push rod for activating said flush valve to perform a partial flush operation;

spring means connecting the body of said push rod to a support, wherein said spring means is provided for returning said push rod to a predetermined position after a flush operation; and

guide means for altering the directions of said first flexible means and said second flexible means.

[c14] 14. The dual flush toilet system according to claim 1, further comprising control means comprising:

a push pad with a T-shaped body pivotally mounted on the cover of said water tank for activating said flush valve to perform a full or a partial flush operation, wherein said push pad rotates about a horizontal axis;

first flexible means connecting said flush valve to said push pad for activating said flush valve to per-

form a full flush operation;
second flexible means connecting said flush valve to said push pad for activating said flush valve to perform a partial flush operation;
spring means with a first end connected to the body of said push pad and a second end against an unmoving surface; and
guide means for altering the directions of said first flexible means and said second flexible means.

- [c15] 15. A flush lever for activating a flush valve to perform dual flush operations for a dual flush toilet system having a water tank with a discharge opening on the bottom, a toilet bowl located below said water tank and connected to said water tank by said discharge opening, said flush lever comprising:
- a handle located outside said water tank and connected with a first pivot through a hole on the upper portion of the wall of said water tank, for operating said flush valve;
 - a lever arm with a first end integrally connected with said first pivot and a second end connected with a second pivot, wherein said lever arm can rotate about said first pivot; and
 - an extension piece with an elongated body having a third end pivotally connected to said second pivot of

said lever arm, wherein said extension piece can turn about said second pivot within a predetermined angle.

[c16] 16. The flush lever according to claim 15, wherein said second end of said lever arm having a slot recessed at said second end open to the top surface and the end surface, wherein said extension piece has said third end slidably inserted into said slot and pivotally connected to said second pivot with the bottom surface of said extension piece against the inner bottom surface of said slot.

[c17] 17. A dual flush toilet system for selectively flushing solid waste or liquid waste, said dual flush toilet system comprising:

- a water tank, with a discharge opening generally located at the bottom of said water tank, for storing and receiving water;

- a toilet bowl located below said water tank and connected to said water tank by said discharge opening;

- a flush valve generally located in said water tank for opening and closing said discharge opening to flush the wastes;

- actuating means connected to said flush valve for activating said flush valve to perform a full flushing operation or a partial flushing operation for said dual flush toilet system;

a transistor having an emitter, a first base, and a second base;
means for connecting said first base to a first terminal of said actuating means;
a timing device for selectively controlling said actuating means for performing a full flushing operation or a partial flushing operation;
means for connecting said second base to a first terminal of said timing device;
means for connecting said emitter to a first terminal of an external D.C. voltage source; and
means for connecting a second terminal of said actuating means and a second terminal of said timing device to a second terminal of said D.C. voltage source.

[c18] 18. The dual flush toilet system according to claim 17, wherein said timing device comprises capacitor means, resistor means, and switch means for controlling the timing of the charge or discharge in said capacitor means.

[c19] 19. The dual flush toilet system according to claim 18, wherein said timing device further comprises:
means for connecting a first terminal of said capacitor means and a first terminal of said switch means to a second terminal of said resistor means;

means for connecting a second terminal of said capacitor means and a second terminal of said switch means to said second terminal of said D.C. voltage source; and

means for connecting a first terminal of said resistor means to said second base.

[c20] 20. The dual flush toilet system according to claim 18, wherein said capacitor means and resistor means are adjustable.

[c21] 21. A dual flush toilet system for selectively flushing solid waste or liquid waste, said dual flush toilet system comprising:

a water tank, with a discharge opening at the bottom of said water tank, for receiving and storing water;

a toilet bowl located below said water tank and connected to said water tank by said discharge opening;

a frame having a first end pivotally mounted on a support and a second end having a pivot which rotates about a generally horizontal axis;

flapper valve means with a hemisphere-shaped lower portion with a chamber including a seal on the lower portion moving upwardly off said discharge opening and moving downwardly to seat against the flange of said discharge opening, wherein said flapper valve means pivotally connected to said second end of said

frame;

first flexible means attached to the first upper side of said flapper valve means for activating said flapper valve means to move up and rotate about said second end; and

second flexible means attached to the second upper side of said flapper valve means for activating said flapper valve means to move up and rotate about said second end.

[c22] 22. The dual flush toilet system according to claim 21, wherein said flapper valve means can turn about said horizontal axis located on upper portion of said flapper valve means.

[c23] 23. The dual flush toilet system according to claim 21, wherein said flapper valve means is pivotally connected to said second end with an axis slidably inserted into said pivot of said second pivot.

[c24] 24. The dual flush toilet system according to claim 21, wherein said flapper valve means has stop means located on said horizontal axis for limiting the rotation within a predetermined angle.

[c25] 25. The dual flush toilet system according to claim 24, wherein said second end comprises shoulder means for

limiting said flapper valve means to rotate within a pre-determined angle, whose surfaces of said shoulders interacting with said stop means.

[c26] 26. The dual flush toilet system according to claim 21, wherein said flapper valve means comprises at least one hole located on the lower portion of the body of said flush valve for timing the flushing operations of said flapper valve means.

[c27] 27. The dual flush toilet system according to claim 26, wherein said hole, said first hole, and said second hole are adjustable.

[c28] 28. The dual flush toilet system according to claim 26, wherein in a flushing operation the upper portion of said hole is employed as a passage for the air to escape from said chamber of said flapper valve means and the lower portion of said hole as a passage for the water in said water tank to enter said chamber of said flapper valve means.

[c29] 29. The dual flush toilet system according to claim 21, wherein said flapper valve means comprises a first hole and a second hole located on the lower portion of the body of said flush valve means for timing the flushing operations of said flapper valve means.

[c30] 30. The dual flush toilet system according to claim 29, wherein in a flushing operation, of said first hole and said second hole, the one located on a higher elevation is employed as a passage for the air to escape from said chamber of said flapper means to said water tank and the one located on a lower elevation is employed as a passage for the water in said water tank to enter said chamber of said flapper valve means.

[c31] 31. A method for performing flushing operations of a dual flush toilet system having a water tank with a discharge opening on the bottom for receiving and storing water, a toilet bowl located below said water tank and connected to said water tank by said discharge opening, a flush handle for activating a flush operation, a flush valve seated on said discharge opening, and an interacting device connecting said flush valve and a support for engaging said flush valve in a full or a partial flush operation, said method comprising:

- activating said flush valve in said water tank and opening discharge opening;
- moving said flush valve upwardly and rotating about a vertical axis in a first direction;
- discharging the water from said water tank through said discharge opening of said water tank to flush wastes in said toilet bowl;

engaging an interaction on said flush valve so that the volume of water used to flush said dual flush toilet system can be controlled according to the wastes in said dual flush toilet system;
moving said flush valve downwardly and rotating about said vertical axis opposite to said first direction; and
seating the flange of said flush valve on said discharge opening.

[c32] 32. The method according to claim 31, wherein said engaging an interaction on said flush valve further comprises a process of limiting the vertical travel of said flush valve.

[c33] 33. The method according to claim 31, wherein said engaging an interaction on said flush valve further comprises a process of applying a downward load on said flush valve.

[c34] 34. A method for performing flushing operations of a dual flush toilet system having a water tank with a discharge opening on the bottom for storing and receiving water, a toilet bowl located below said water tank and connected to said water tank by said discharge opening, a flapper valve with a hemisphere-shaped lower portion with a chamber comprising at least one hole on the

lower portion of said flapper valve, a flush handle for activating said flush valve to perform a flush operation, a frame having a first end pivotally mounted on a support and having a second end having a pivot on a horizontal axis, and first flexible means and second flexible means attached on upper portion of said flapper valve, said method comprising:

- activating said flapper valve from said water tank by pulling said first flexible means or said second flexible means;

- lifting said flapper valve upwardly and rotating said flush valve about said horizontal axis in a first direction;

- discharging the water from said water tank through said discharge opening of said water tank to flush the waste in said toilet bowl;

- decreasing buoyancy of said flapper valve by replacing the air inside said flapper valve with the water from said water tank;

- moving said flapper valve means downwardly and rotating said flapper valve about said horizontal axis in opposite to said first direction; and

- seating the flange of said flapper valve on said discharge opening.